I. REMARKS

The pending Action states that Claims 1-22, 25-29, 31-35 and 37-39 are in the case. Applicants agree, except with respect to Claim 7, which was cancelled by amendment in a previous Response to Office Action filed March 31, 2004. Thus, Applicants submit that a revised statement of the claims remaining in the case should include Claims 1-6, 8-22, 25-29, 31-35 and 37-39.

Claims 1, 3-6, 8-10, 13, 21 and 25-28 stand rejected under 35 U.S. 102(b) as being anticipated by, or alternatively under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,988,760 to Durup *et al.* Claims 37-38 stand rejected as being unpatentable over U.S. Patent No. 5,988,760 to Durup *et al.* Claims 1, 3-6, 8-10, 13, 19, 21, 25-28 and 35 are rejected under 35 U.S.C. § 103(a) as being obvious over U.S. Patent No. 4,425,003 to Huff. Claims 2, 11, 20, 22 and 29 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 4,425,003 to Huff in view of U.S. Patent No. 3,953,073 to Kube. Claim 12 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 4,425,003 to Huff in view of U.S. Patent No. 2,822,158 to Brinton. Claims 14-18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 4,425,003 to Huff in view of U.S. Patent No. 4,222,611 to Larson *et al.* Claim 39 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,988,760 to Durup *et al.* in view of U.S. Patent No. 4,222,611 to Larson *et al.* The rejections are respectfully traversed.

III. ARGUMENTS

Claims 1, 21 and 37 are independent in form. Thus, if any (or all) of Claims 1, 21 and 36 are deemed allowable, then all claims depending therefrom are also allowable as a matter of law. See *In re Fine*, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988). The substance of Applicants' argument is therefore directed primarily to the independent claims mentioned above, as amended.

Each of Claims 1, 21 and 37 is allowable because none of the prior art, whether considered alone or in combination, teaches or suggests a method for solution-mining a subterranean material *in an elbow well having a single cavity*, wherein the method comprises "injecting a fluid into said elbow well *through only a single opening disposed at a terminal end of an injection tube*, said fluid forming a subterranean mixture with said subterranean material in said single cavity" as claimed herein.

Huff teaches "a method for establishing *two or more* cavities *contemporaneously* ... from which to solution mine" (see *Summary of the Invention*, ll. 1-3), practiced by first opening *pairs* of fluid transport chimneys (20 and 21) and only "[a]fter these *openings* are completed" is "the actual solution mining" begun (Huff at col. 2, lines 33-39). Thus, Huff expressly teaches away from "actually mining" from a single cavity, and fails to satisfy each of the material elements of the instant claims.

The Action also suggests that mining from a single cavity would be an obvious derivative of mining from two or more cavities, but that assumption is incorrect. For example, those of ordinary skill in the art will appreciate that single-cavity mining is superior to multi-cavity, fracture type wells such as those disclosed in Huff and Durup (for support in Applicants' *Specification*, see, *e.g.*, page 6 at line 22 *et seq.*). As seen in the attached printout from a topical Internet site, well-known field problems associated with multi-cavity fracture-type wells include

inadvertent and excessive water production, inadvertently damaged and ruined wells, plugged and/or otherwise defective fractures, significant loss of reserves due to ineffective fracturing, *etc.*

Thus, the Action's legal statement that "[i]t is well established in patent law that the omission of an element (in this case the second cavity) and its function is obvious if the function of the element is not desired" actually supports the Applicants rather than the rejection, since the function of the second cavity (to dissolve and mine additional subterranean material) is still desirable, but the technical problems associated with such fracturing methods require so much time and money to overcome that Applicants' "single cavity" approach is an important aspect of practicing the invention, and does not merely define an "intended use" as suggested (see Action at page 12, ll. 6-8).

Similarly, Durup also fails to meet the advantageous "single cavity" recitation, because the system's principle of operation requires that a plurality of subcavities always remain in fluid communication with one another so as to permit the mixture created by injection of a fluid into the last subcavity in the system to be extracted through intervening "extraction channels" (see Durup at col. 4, ll. 12-19, *esp.*, "the subcavities are connected *two at a time*", and at col. 4, ll. 32-46). As a consequence of the Durup method, all cavities in the system are necessarily formed at least two at a time, rather than as single cavities. Even in Figure 6, which the Office has cited as a basis for meeting the single cavity limitation (see reference 20a), it is seen that a second cavity 20b is being mined simultaneously as a result of the channels cut by cutting apparatus 10 prior to initiating operations, and by the additional cavity expansion caused by this type of fracturing.

Moreover, Durup, like Huff, fails to teach or suggest *injecting a fluid into said elbow well through only a single opening disposed at a terminal end of an injection tube* as recited in each of Claims 1, 21 and 36. To the contrary, Huff and Durup both teach injection of fluids into side

cavities cut out from holes opened in the pipe casing, so that fracture-type channels will open and connect the various cavities. In short, since (i) the prior art fails to contemplate any of the important technical advantages of single cavity mining, whereas Applicants have put forth a convincing theory as to why such a distinction should carry patentable weight (see discussion above), and (ii) none of the prior art, whether considered alone or in combination, teaches or suggests single cavity mining carried out by injecting a fluid into an elbow well through only a single opening disposed at a terminal end of an injection tube, Applicants submit that independent Claims 1, 21 and 37, as amended, are patentably distinct and should now be allowed. And finally, since each of the remaining claims in the case depend either directly or indirectly from one of independent Claims 1, 21 or 37, it follows that each of the dependent claims must also be allowable under the doctrine of *In re Fine, supra.*

IV. CONCLUSION

In view of the foregoing, Applicants submit that each of the outstanding grounds of rejection pending in the case has been overcome and should now be removed. Reconsideration and withdrawal of the rejections, and allowance of the amended claims at an early date, are respectfully requested.

Respectfully submitted,

Raymond R. Ferrera, Esq.
USPTO Reg. No. 47,559
ARNOLD & FERRERA, L.L.P.
2401 Fountainview, Suite 630
Houston, Texas 77057
Telephone: (713) 972-1150
Facsimile: (713) 972-1180
ATTORNEY FOR APPLICANTS

Well Completion Problems Common to Industry

- **Excessive fracture height ("treating out of zone") commonly results in excessive water production & damaged or ruined wells**
- **Poor completions in the initial test well often results in writing off reserves & reduction of further field well drilling.**
- **Significant loss of reserves due to ineffective reservoir fracturing (usually irreversible when frac-induced damage)**
- **Zonal isolation**
- **Inadequate fracture length often yields decreased reserve recoveries & reduced rate of return on investment**
- **Poor proppant placement in reservoir fractures frequently results in diminshed recovery of reserves**
- **Excessive pump treating pressures often occur during stimulation procedures and result in higher costs and greater risks to the well equipment and personnel**
- **Currently, industry stimulation results are determined by post-stimulation analysis (data acquired after the fracturing process)**

Other Stimulation Considerations

- **Excessive fluid loss to formation results in gel-fluid-clay skin damage and plugging of fracture and reservoir permeability**
- **Pressure limitations inherent to present surface-mixed completion methods commonly result in premature termination of stimulation treatments**
- **Proppant transport and settling within induced fracture commonly results in inefficient reservoir fracture drainage**
- **Borate "clean" fluids not compatible with CO_2**
- **Can be mixed via downhole fracturing**

Premature Screenout results when excessive fracturing fluid bleedoff into the reservoir zone occurs, thus resulting in proppant packoff in the induced fracture (and an abrupt end to the stimulation treatment). Usually as a result, the entire frac job isn't pumped & the reservoir zone is understimulated, which often results in an ultimate loss of reserve recovery.

Understimulating and treating out of zone is a serious and chronic problem in the petroleum industry. A successful stimulation process is essential for assurance of enhanced petroelum recovery and increased cashflow to the operator.